

1.5V Drive Pch MOSFET

RAL045P01

● Structure

Silicon P-channel MOSFET

● Features

- 1) Low On-resistance.
- 2) Small high power package.
- 3) Low voltage drive.(1.5V)

● Application

Switching

● Packaging specifications

Type	Package	Taping
	Code	TCR
	Basic ordering unit (pieces)	3000
RAL045P01		○

● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Drain-source voltage	V_{DSS}	-12	V
Gate-source voltage	V_{GSS}	0 to -8	V
Drain current	Continuous	I_D	±4.5 A
	Pulsed	I_{DP} *1	±18 A
Source current (Body Diode)	Continuous	I_S	-0.8 A
	Pulsed	I_{SP} *1	-18 A
Power dissipation	P_D *2	1	W
Channel temperature	Tch	150	°C
Range of storage temperature	Tstg	-55 to +150	°C

*1 $P_w \leq 10 \mu s$, Duty cycle $\leq 1\%$

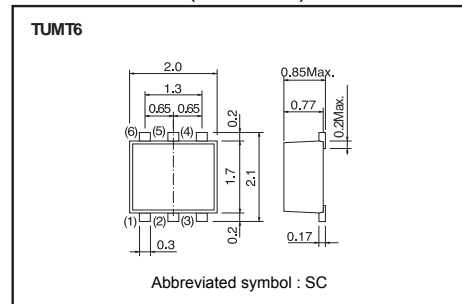
*2 Mounted on a ceramic board.

● Thermal resistance

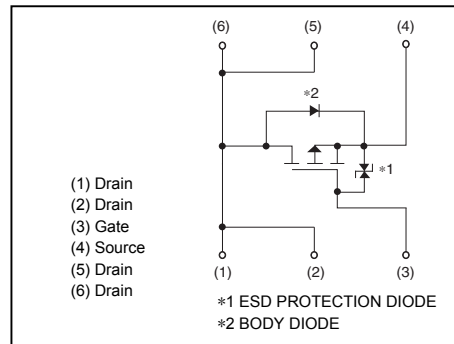
Parameter	Symbol	Limits	Unit
Channel to Ambient	$R_{th}(ch-a)^*$	125	°C / W

*Mounted on a ceramic board.

● Dimensions (Unit : mm)



● Inner circuit



● Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	-10	μA	$V_{GS}=-8\text{V}, V_{DS}=0\text{V}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	-12	-	-	V	$I_D=-1\text{mA}, V_{GS}=0\text{V}$
Zero gate voltage drain current	I_{DSS}	-	-	-10	μA	$V_{DS}=-12\text{V}, V_{GS}=0\text{V}$
Gate threshold voltage	$V_{GS(th)}$	-0.3	-	-1.0	V	$V_{DS}=-6\text{V}, I_D=-1\text{mA}$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	22	30	m Ω	$I_D=-4.5\text{A}, V_{GS}=-4.5\text{V}$
		-	28	39		$I_D=-2.2\text{A}, V_{GS}=-2.5\text{V}$
		-	38	57		$I_D=-2.2\text{A}, V_{GS}=-1.8\text{V}$
		-	50	100		$I_D=-0.9\text{A}, V_{GS}=-1.5\text{V}$
Forward transfer admittance	$ Y_{fs} ^*$	5.5	-	-	S	$I_D=-4.5\text{A}, V_{DS}=-6\text{V}$
Input capacitance	C_{iss}	-	4200	-	pF	$V_{DS}=-6\text{V}$
Output capacitance	C_{oss}	-	350	-	pF	$V_{GS}=0\text{V}$
Reverse transfer capacitance	C_{rss}	-	330	-	pF	$f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}^*$	-	16	-	ns	$I_D=-2.2\text{A}, V_{DD}=-6\text{V}$
Rise time	t_r^*	-	60	-	ns	$V_{GS}=-4.5\text{V}$
Turn-off delay time	$t_{d(off)}^*$	-	400	-	ns	$R_L=2.7\Omega$
Fall time	t_f^*	-	150	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	40	-	nC	$I_D=-4.5\text{A}$
Gate-source charge	Q_{gs}^*	-	6.5	-	nC	$V_{DD}=-6\text{V}$
Gate-drain charge	Q_{gd}^*	-	6.0	-	nC	$V_{GS}=-4.5\text{V}$

*Pulsed

● Body diode characteristics (Source-Drain) (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	-1.2	V	$I_s=-4.5\text{A}, V_{GS}=0\text{V}$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical output characteristics (I)

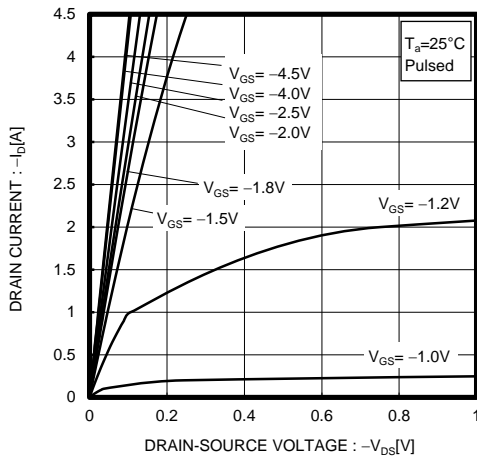


Fig.2 Typical output characteristics(II)

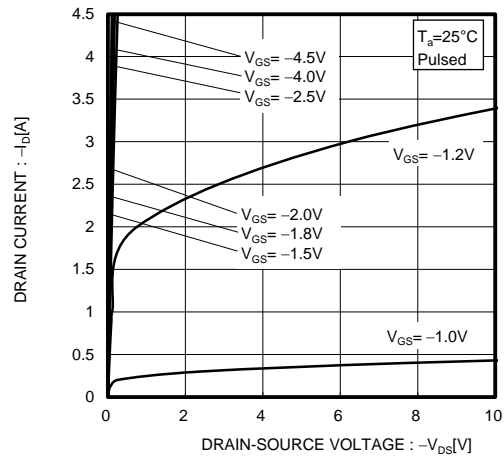


Fig.3 Typical Transfer Characteristics

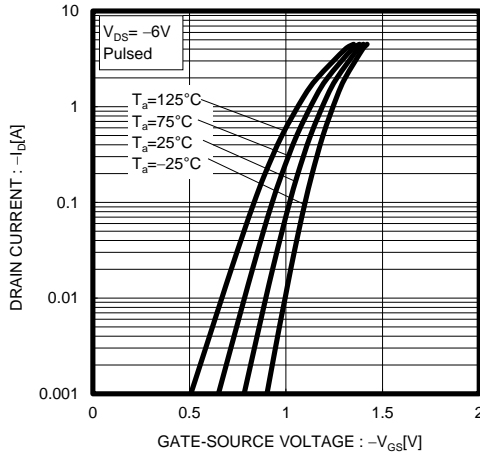


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

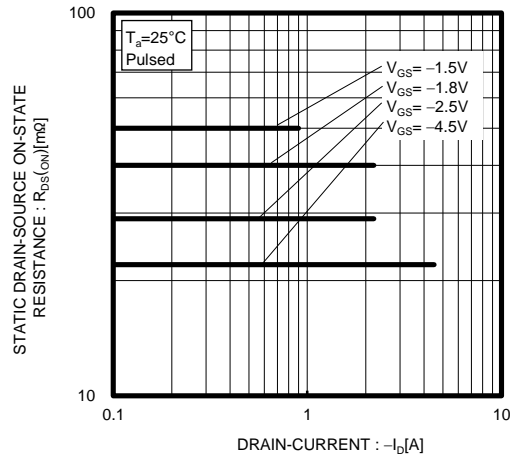


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

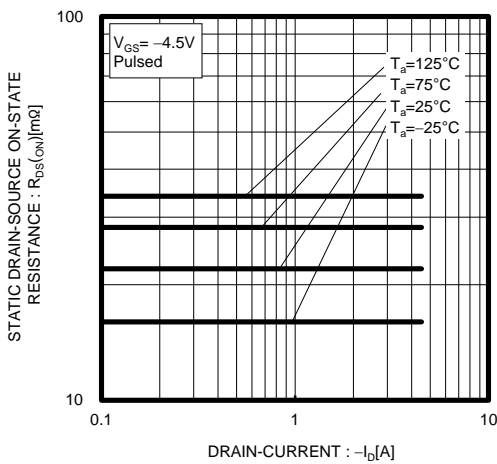


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(III)

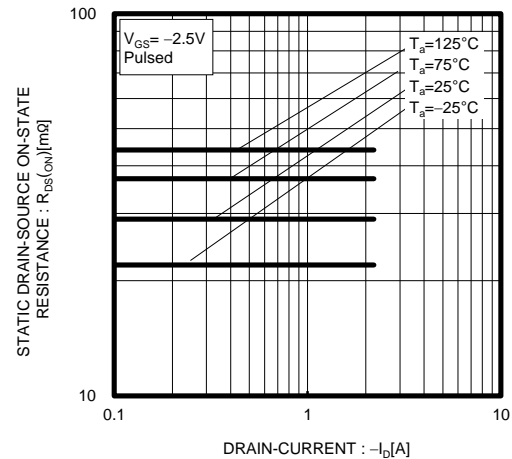


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(I_D)

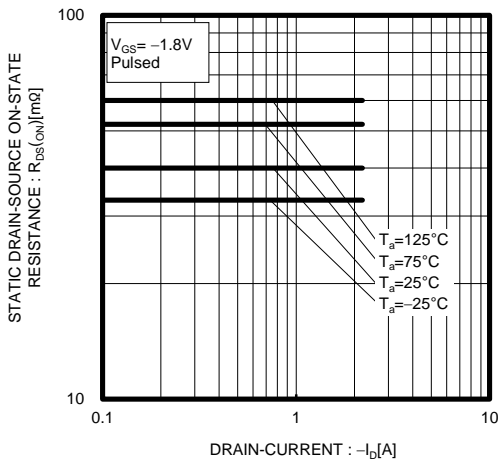


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(V)

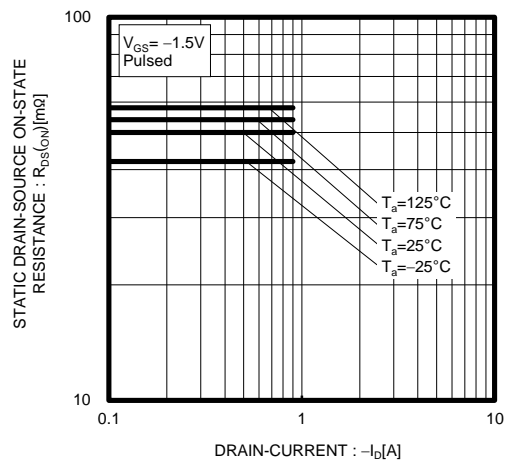


Fig.9 Forward Transfer Admittance vs. Drain Current

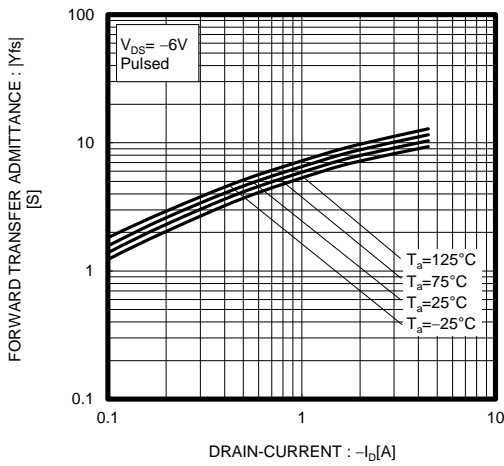


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

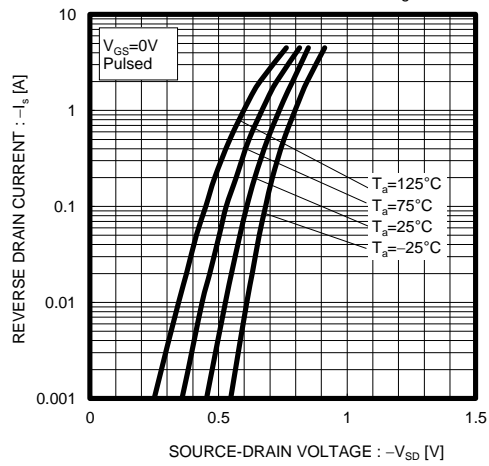


Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

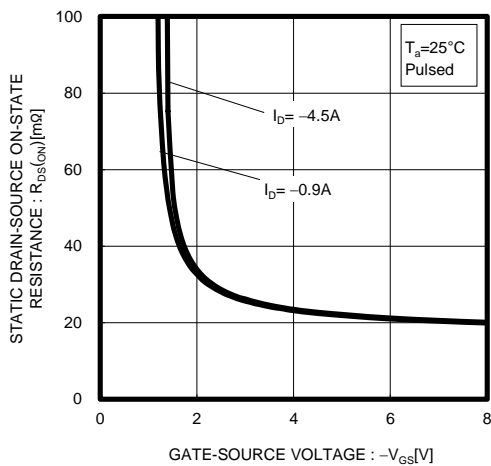


Fig.12 Switching Characteristics

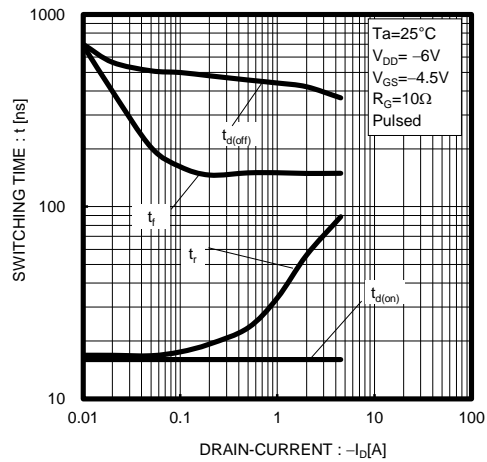


Fig.13 Dynamic Input Characteristics

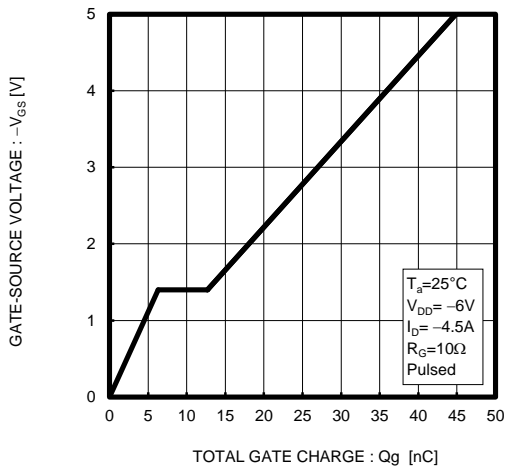
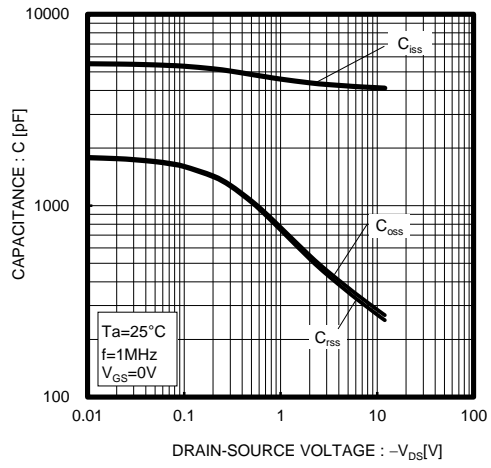


Fig.14 Typical Capacitance vs. Drain-Source Voltage



● Measurement circuits

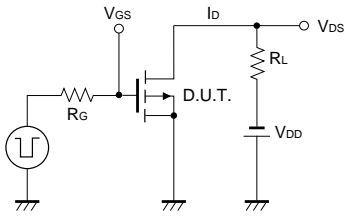


Fig.1-1 Switching Time Measurement Circuit

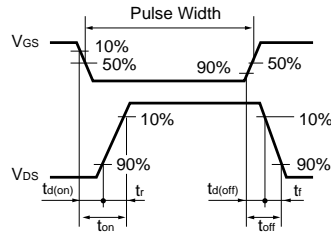


Fig.1-2 Switching Waveforms

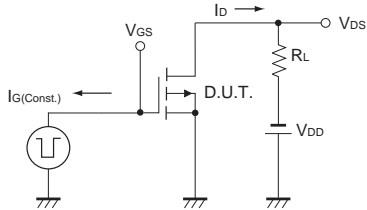


Fig.2-1 Gate Charge Measurement Circuit

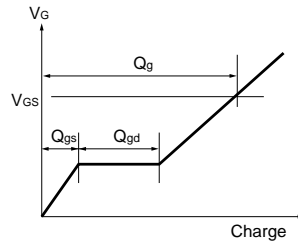


Fig.2-2 Gate Charge Waveform

● Notice

This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.

Notes

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